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10/762,515	01/23/2004	Jacob Mozel	4707-001	5240

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EXAMINER	
FEELY, MICHAEL J	

ART UNIT	PAPER NUMBER
1712	

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/762,515	MOZEL ET AL.	
	Examiner	Art Unit	
	Michael J. Feely	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) *23-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☒ Claim(s) *1-22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *0805*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I (claims 1-22) in the reply filed on March 28, 2006 is acknowledged. The traversal is on the ground(s) that "The hypothetical processes might be different, but Applicants are not persuaded that they are *materially* different." This is not found persuasive because: (a) the processes set forth in groups II and III result in an intimate/composite relationship between the inert filler and the curing agent; and (b) the process set forth in Group I does not result in the intimate/composite relationship between the inert filler and the curing agent.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 23-32 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on March 28, 2006.

Claim Objections

3. Claims 1-22 are objected to because of the following informalities:

- In claim 1, "viscosity lower 50 Cp" should be replaced with --viscosity lower than 50 Cp--; and "surface tension lower 80 dyn/cm" should be replaced with --surface tension lower than 80 dyn/cm--.
- In claim 2, "viscosity lower 50 Cp" should be replaced with --viscosity lower than 50 Cp--.

- In claim 5, "the electronic manufacturing" should be replaces with --electronic manufacturing--.
- The language of claim 6 is convoluted. A recommended change is: --The ink according to claim 2, especially adapted for electronic printing in the manufacturing of passive component capacitors and resistors.--
- The language of claim 7 is convoluted. A recommended change is: --The ink according to claim 2, especially adapted for electronic printing of conductive lines and features, such as lines, pads, and bumps.--
- In claim 8, "wherein the major portion of the epoxy comprising polymers selected from" should be replaced with --wherein a major portion of the epoxy-based resin comprises polymers selected--.
- In claim 8, "Need More" should be deleted.
- In claim 12, "Need More" should be deleted.
- In claim 16, "Need More" should be deleted.
- In claim 19, "in final concentration ranges" should be changed to in --a final concentration range--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 1 recites the limitation "said single-pack or two-pack ink" in the composition. There is insufficient antecedent basis for this limitation in the claim. There is no previous mention of a "single-pack" or "two-pack" ink previously in the claim. A recommended change is:

-- 1. A single-pack or two-pack liquid thermosetting ink for ink-jet applications, comprising: (a) one or more resins; (b) at least one solid latent curing agent characterized by a maximal particle size of less than 2 microns; and (c) an inert filler having fine particles; wherein said single-pack or two-pack ink is characterized by: a viscosity lower than 50 Cp at application temperature; a surface tension lower than 80 dyn/cm at application temperature; and a glass transition temperature of said ink, in cured form, of greater than 120°C. --

7. Claim 18 recites the limitation "An Non halogenated flame retardant" in the composition of claim 2. There is insufficient antecedent basis for this limitation in the claim. A recommended change is:

-- 18. The ink according to claim 2, further comprising amino resins selected from melamine-based resins, urea resins, benzoguanamine resins or any mixture thereof. --

Claim Interpretation

8. In claims 1-22, the recitation *"for ink-jet applications,"* has been given little patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded

patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

In the instant case, the preamble merely recites the intended use of the liquid thermosetting ink, wherein the prior art can meet this future limitation by merely being capable of such intended use.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-12 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Masse et al. (US Pat. No. 5,478,885), Muroi et al. (US Pat. No. 5,480,957), and Hopper et al. (Pub. No. US 2006/0047014).

Regarding claims 1-12, 18, 21, and 22, Masse et al. disclose: ***(1)*** a liquid thermosetting ink (Abstract; column 1, lines 5-17: *note "solder masking compounds"*) comprising: (a) one resin or more (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18); (b) at least one curing agent (Abstract; column 8, lines 19-29); and (c) inert filler having fine particles (column 9, lines 23-31); ***(2)*** wherein the resin is an epoxy-based resin (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18);

(3) wherein the curing agent is selected from compositions containing modified amines, urea derivatives, imidazoles, dicyandiamide, inorganic boron salts or any mixture thereof (column 8, lines 19-29);

(4) especially adapted for solder mask applications (*Inherently capable of satisfying future limitation; furthermore,* column 1, lines 5-17; column 10, lines 60-63); ***(5)*** especially adapted for bonding devices or components in electronic manufacturing (*Inherently capable of satisfying future limitation; furthermore,* column 1, lines 5-17; column 10, lines 60-63); ***(6)*** especially adapted for electronic printing in the manufacturing of passive component capacitors

and resistors (*Inherently capable of satisfying future limitation; furthermore,* column 1, lines 5-17; column 10, lines 60-63); ***(7)*** especially adapted for electronic printing of conductive lines and features, such as lines, pads, and bumps (*Inherently capable of satisfying future limitation; furthermore,* column 1, lines 5-17; column 10, lines 60-63);

(8) wherein a major portion of the epoxy-based resin comprises polymers selected from DGEBA, EPN, ECN, DGEBF, commercially available bisphenol A based novolac products or any combination thereof (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18);

(9) additionally comprising reactive diluents and/or mono-epoxides (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18); ***(10)*** wherein the diluents and/or mono-epoxides are selected from aromatic, heterocyclic, and/or cycloaliphatic compositions (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18);

(11) additionally comprising impact modifiers and/or flexibilizers having rubbery moieties or blocks in their chain (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18); ***(12)*** wherein the impact modifiers and/or flexibilizers are selected from *see claim for list* (Abstract; column 3, lines 24-48; column 7, line 1 through column 8, line 18);

(18) additionally comprising amino resins selected from melamine-based resins, urea resins, benzoguanamine resins or any mixture thereof (column 9, lines 37-41);

(21) additionally comprising additives selected from surface active agents and/or colloid stabilizers; rheology modifiers; pigments and dyes; matting agents; solvents; co-solvents; diluents and mixtures thereof (column 7, line 1 through column 8, line 18; column 9, lines 42-

44); and *(22)* wherein the solvents; co-solvents or diluents are at least partially volatile or unsaturated (column 7, line 1 through column 8, line 18; column 9, lines 42-44).

The teachings of Masse al. are deficient because they do not teach the following:

- (A) wherein the curing agent is *(1)* at least one solid latent curing agent characterized by a maximal particle size of less than 2 microns;
- (B) wherein the ink is characterized by: *(1)* a viscosity lower than 50 cp at application temperature; and *(2)* a viscosity lower than 20 cp at application temperature;
- (C) wherein the ink is characterized by: *(1)* a surface tension lower than 80 dyn/cm at application temperature; and *(2)* a surface tension ranging from 24 to 34 dyn/cm at application temperature; and
- (D) wherein the cured ink features: *(1 & 2)* a glass transition temperature greater than 120°C.

With respect to deficiency (A), Muroi et al. disclose, "A curing agent for epoxy resins is prepared from an amine and an epoxy, as well as subsequent modification by a polyisocyanate compound, in a manner that the curing agent is in the form of small spherical particles," (Abstract), wherein, "The particles can be as small as 0.1 microns," (Abstract). They continue with, "More specifically, it relates to a curing agent master-batch for epoxy resin which not only has excellent storage stability and excellent compatibility with an epoxy resin but also can give a one-component curing composition having a low viscosity, fast curing rate, and excellent storage stability when added to an epoxy resin," (column 1, lines 17-23). Furthermore, they disclose, "The above-mentioned features allow the spherical particles of the present invention to be used as a one-component curing composition for epoxy resin for a broad range of applications.

Examples are...impregnation of glass cloth for printed circuit board, IC chip sealing material, electrically conductive paint, *solder resist*, adhesive for die bonding, adhesive for printing board, and electrically conductive adhesive and the like in the electronic field," (column 12, lines 8-19).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to (A) use at least one solid latent curing agent characterized by a maximal particle size of less than 2 microns, as taught by Muroi et al., in the solder resist composition of Masse et al. because Muroi et al. disclose: (1) that their submicron curing agent is appropriate for epoxy resin compositions used in various electronics applications, including solder masks; and (2) the use of their submicron curing agent is beneficial in that it can give a one-component curing composition having a low viscosity, fast curing rate, and excellent storage stability when added to an epoxy resin.

With respect to deficiency (D), the combined teachings of Masse et al. and Muroi et al. do not explicitly disclose a cured product with a glass transition temperature of greater than 120°C. However, two things should be noted in these references: (1) the main epoxy ingredient in Masse et al. is a bisphenol-A epoxy resin *(see column 3, lines 24-48)*; and (2) the examples of Muroi et al. suggest that the use of their curing agent with a bisphenol-A epoxy resin inherently leads to a glass transition temperature above 120°C *(see Examples and Tables)*.

Therefore, it appears that the combined teachings of Masse et al. and Muroi et al. would have inherently led to a cured product having a glass transition temperature above 120°C because: (1) the main epoxy ingredient in Masse et al. is a bisphenol-A epoxy resin; and (2) the examples of Muroi et al. suggest that the use of their curing agent with a bisphenol-A epoxy resin inherently leads to a glass transition temperature above 120°C.

With respect to deficiency (B), the combined teachings of Masse et al. and Muroi et al. mention the formation of a low-viscosity material useful as a solder mask; however, they do not explicitly disclose viscosity ranges of lower than 50 cp and lower than 20 cp at application temperature.

It should be noted that Applicant fails to demonstrate critically for these ranges. In addition, Hopper et al. disclose a solder mask ink based on acrylic monomers and curable polymer materials, such as epoxy resins *(see Abstract; paragraph 0038)*. They disclose that viscosity of the ink is tailored based on the printing equipment used and the application temperature of the ink *(see paragraph 0017)*, wherein their most preferred viscosity if from 8 to 15 cp at 40°C *(see paragraph 0017)*. The teachings of Hopper et al. demonstrate that the viscosity of solder mask inks is a result effective variable, dictating the means of which the ink is applied.

In light of this, it has been found that, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and, "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation," – *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time to the invention to (B) optimize the viscosity to a range of below 50 cp or below 20 cp at application

temperature because the teachings of Hopper et al. demonstrate that the viscosity of solder mask inks is a result effective variable, dictating the means of which the ink is applied.

With respect to deficiency (C), the combined teaching of Masse et al. and Muroi et al. are silent regarding surface tension of their solder mask ink. Hence, they do not disclose ranges of lower than 80 dyn/cm and from 24 to 34 dyn/cm at application temperature.

It should be noted that Applicant fails to demonstrate critically for these ranges. In addition, Hopper et al. disclose a solder mask ink based on acrylic monomers and curable polymer materials, such as epoxy resins *(see Abstract; paragraph 0038)*. They disclose that their solder mask ink preferably has a surface tension of from 20 to 40 and especially between 25 and 35 mN/m (dyn/cm) *(see paragraph 0045)*. The teachings of Hopper et al. demonstrate that a surface tension of between 25 and 35 dyn/cm is recognized in the art as a preferred range for solder mask inks; hence, surface tension is a result-effective variable/property.

In light of this, it has been found that, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and, "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation," – *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time to the invention to (C) optimize the surface tension to a range of below 80 dyn/cm or from 24 to 34 dyn/cm at application temperature because the teachings of Hopper et al. demonstrate that

surface tension is a result-effective variable/property, wherein a surface tension of between 25 and 35 dyn/cm is recognized in the art as a preferred range for solder mask inks.

Regarding claims 19 and 20, the combined teachings of Masse et al. and Muroi et al. disclose the use of between 1 and 30 wt% of fillers *(see Masse et al.: column 9, lines 23-31)*; however, they fail to specify a particle size limitation for these fillers. Hence, they do not disclose a maximal particle size of 2 microns or 300 nm.

It should be noted that Applicant fails to demonstrate critically for these ranges. In addition, one skilled in the art would have recognized that smaller-sized particles have less impact on overall viscosity than larger-sized particles. This would be pertinent in the instant case because the teachings of the prior art call for a low-viscosity composition.

In light of this, it has been found that, "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); and, "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation," – *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the filler-size to a maximal particle size of 2 microns or 300 nm because one skilled in the art would have recognized that smaller-sized particles have less impact on overall viscosity than larger-sized particles. This would be pertinent in the teachings of Masse et al. and Muroi et al. because the teachings of the prior art call for a low-viscosity composition.

13. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Masse et al. (US Pat. No. 5,478,885), Muroi et al. (US Pat. No. 5,480,957), and Hopper et al. (Pub. No. US 2006/0047014) in view of JP 63-261253.

Regarding claims 13 and 14, the combined teachings of Masse et al. and Muroi et al. disclose the use of additives; however, they do not disclose: ***(13)*** additionally comprising adhesion promoters; and ***(14)*** wherein the adhesion promoters are organometallic compounds selected from siloxane, zirconate, titanate, aluminate, or any mixtures thereof.

JP 63-261253 demonstrates that coupling agents, including silanes, titanates, and Al-based materials *(see Abstract)*, are recognized in the art as suitable additives for epoxy-based solder mask compositions.

In light of this, it has been found that the selection of a known material based on its suitability for its intended use supports a *prima facie* obviousness determination – *see MPEP 2144.07.*

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add an adhesion promoter, as taught by JP 63-261253, in the combined teachings of Masse et al., Muroi et al., and Hopper et al. because the teachings of JP 63-261253 demonstrate that coupling agents, including silanes, titanates, and Al-based materials, are recognized in the art as suitable additives for epoxy-based solder mask compositions.

Allowable Subject Matter

14. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 15, the system set forth by the combined teachings of Masse et al. and Muroi et al. does not appear to be capable of undergoing curing by actinic radiation. The latent curing agent is heat activated.

Regarding claim 16, the system of Hopper et al. (actinic curing) uses a combination of epoxy resins and unsaturated monomers. Although the general teachings, with respect to properties and additives of masking inks, are applicable to the teachings of Masse et al. and Muroi et al. (heat cured), there is no nexus with respect to reactive materials. There appears to be no teaching, suggestion, or motivation to add the claim 16 materials to the system of Masse et al. and Muroi et al.

Regarding claim 17, there is no teaching or suggestion to add photo-initiators to the combined teachings of Masse et al. and Muroi et al. because their system is heat cured.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is 571-272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael J. Feely
Primary Examiner
Art Unit 1712

April 28, 2006

MICHAEL FEELY
PRIMARY EXAMINER